DIGITAL INDUSTRIES SOFTWARE

Simcenter SCADAS Mobile and Lab Four-channel Input Module for Rotational Vibration

Simcenter/RV4/2406/20240625

Product Information Sheet

Summary

RV4 input module

In a single Simcenter SCADAS Mobile or SCADAS Lab slot, the Rotational Vibration (RV4) module is a fast and accurate signal conditioner for low speed and high speed tacho signals from analogue sources, digital sources and/or incremental encoders.

The RV4 accurately conditions, acquires and processes tacho signals to produce time data, angle data or rotational speed data, selectable per channel and fully synchronized with data acquired from other dynamic channels.

Supported transducers

Typical applications

BENEFITS

- Multi-functional module supporting any combination of analog tacho, digital tacho and incremental encoder
- Simultaneous and synchronic acquisition of rotational signals and normal analog signals (accelerometer, microphone, etc.)
- Supporting processing functions for synchronous order tracking and angle domain applications

FEATURES

- Fully software controlled selection of four tacho channels (analog and digital), one incremental encoder & two tacho (analog and digital) or two incremental encoders
- Real-time correction for missing pulses or double pulses
- Real-time separation of static and dynamic speeds
- Ultra-high speed 820 MHz counter for 1.2 nsec tacho resolution

The RV4 additionally supports pre-conditioned tacho signals (digital tacho) and uses an 820 MHz counter to capture signals for up to 204.8 kHz and maximum pulse-rate of 1 MHz in combination with “pulse to skip” function.

Torsional vibration information

Supporting applications that require multiple tacho inputs, the RV4 module offers a dedicated solution for highly accurate torsion analysis of rotating objects. The module analyses the complete tacho input signal and employs 24-bit digital signal processing to convert time data into RPM data and is then converted to torsional vibration, expressed in radian per second.

These torsional vibration signals are then processed in the application software for filtering, re-sampling, order tracking, etc.

Angular position information

The RV4 module provides angular position information allowing accurate analysis of data containing time variant frequency components.

The angle information is retrieved directly from the tacho time stamps that are measured with 1.2 ns tacho resolution.

Onboard processing

Correction for missing /double pulses, pulses to skip, triggering on rising, falling, rising/falling edge, synchronization between RPM and other dynamic channels.

Product Information Sheet

<table>
<tr><th>General information</th><th>RV4 specifications</th></tr>
<tr><td>Product name</td><td>SCM-RV4, SCM-RV4-RT, SCL-RV4, SCL-RV4-RT</td></tr>
<tr><td>Description</td><td>Simcenter SCADAS Mobile and Lab Four-channel Input Module for Rotational Vibration with Ethercat support</td></tr>
<tr><td>Input function</td><td>Analog Tacho: Differential with 50kΩ impedance, TTL, single-ended ICP
Digital Tacho: TTL
Incremental Encoder: RS422, supporting A, B and reference signals

Analog tacho: ±2 V, ±20 V (from ±100 mv to ±20V with soft clipping)</td></tr>
<tr><td>Digital interface</td><td>EtherCAT write, (requires ESO64 module) on -RT versions, Incremental encoder</td></tr>
<tr><td>Transducer connector</td><td>Tacho: 4-pin LEMO size 00,
Incremental Encoder: 10-pin LEMO size 1B</td></tr>
<tr><th>A/D Converter</th><th></th></tr>
<tr><td>Max. sampling rate</td><td>24-bit ADC sampling at 204.8 kHz, 820 MHz clock at digital Tacho and and Incremental Encoder

Analog Tacho
Input pulse rates up to 40 kHz. Controlled data acquisition down to zero speed (0 Hz pulse rate)
Digital Tacho, Incremental Encoder
Input pulse rate up to 204.8 kHz maximum pulse rate of 1 MHz in combination with “pulse to skip” function

<table>
<tr><th></th><th>Analog Tacho</th><th>Digital Tacho</th><th>Incremental Encoder</th></tr>
<tr><td>Sampling rate</td><td>204.8 kHz</td><td>820 MHz</td><td>820 MHz</td></tr>
<tr><td>Maximum pulse rate</td><td>40 kHz</td><td>204.8 kHz
up to 1MHz using ‘pulses to skip’</td><td>204.8 kHz</td></tr>
<tr><td>Typical Scenario</td><td>Up to 360 pulses/rev at 6500 rpm</td><td>Up to 1440 pulses/rev at 8000 rpm</td><td>Up to 1440 pulses/rev at 8000rpm</td></tr>
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</td></tr>
<tr><td>ADC Architecture</td><td>24 bit Sigma Delta ADC</td></tr>
<tr><td>Coupling</td><td>ICP, AC, DC</td></tr>
<tr><th>Power</th><th></th></tr>
<tr><td>Power consumption/power budget</td><td>7 W available for the module and the sensors (during normal operation, no overload and ICP supply switched on).

LED on the module front panel, providing information on connection, power status and any sensor supply overload/underload.</td></tr>
<tr><td>Power feedback</td><td>During system booting and startup, the LED on channel 1 will be used to indicate module status (active) using a different LED color and/or blinking pattern.</td></tr>
<tr><td>ICP sensor supply</td><td>5 mA ±15% from 28 V source 5V Sensor supply delivering up to 200mA per 2 tacho inputs</td></tr>
<tr><th>Protection</th><th></th></tr>
<tr><td>Input protection</td><td>All input pins are protected against ±40 V overvoltage (without damage).</td></tr>
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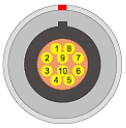
ESD protection	According to EN61000-4-2, level 2 and ISO10605
EMC protection	Comply with CE-EMC directive, when installed in a SCADAS Mobile frame
Shock protection	MIL-STD-810F 60 gpk applying an 11 ms saw tooth shock pulse, three shocks per direction;
Vibration protection	MIL-STD-810F (2-2000Hz random, 7.7grms)
Ambient operating temperature range	-20 ºC to +55 ºC
Storage temperature range	-20 °C to +70 °C
Housing	
Dimensions	1 Simcenter SCADAS slot
Connector and pinning layout	

CONNECTION	DETAILS	REMARKS
10-pin LEMO: channels IE1 and IE2  Chassis = Analog Ground	Connector type: LEMO-EGG.1B.310 Pin details: 1) -U1 (-B) 2) +U1 (+B) 3) -U0 (-A) 4) +U0 (+A) 5) + 5V supply 6) Ground 7) Sense ground 8) + 5V supply sense line 9) -Ref pulse (-Index) 10) +Ref pulse (+Index)	Mating connector: LEMO-FGG.1B.310.CLADxx
4-pin LEMO: channels T1 to T4  Chassis = Analog Ground	Connector type: LEMO-EGG.00.304 Pin details: 1) Ground 2) + 5V supply 3) - IN 4) + IN	Mating connector: LEMO-FGG.00.304.CLADxx

SCM-RV4

SCL-RV4

Ordering information:

Support of Simcenter SCADAS Frames and Modules may be restricted in specific Simcenter Testlab application workbooks.

Please check with your local representative for full details.

SCM-RV4: Simcenter SCADAS Mobile 4 channel rotational vibration module

SCM-RV4-RT: Simcenter SCADAS Mobile 4 channel rotational vibration module with EtherCAT support*

SCL-RV4: Simcenter SCADAS Lab 4 channel rotational vibration module

SCL-RV4-RT: Simcenter SCADAS Lab 4 channel rotational vibration module with EtherCAT support*

Included accessories

Four 50cm LEMO to BNC cables

Two 10 pins LEMO 1B plugs (FGG.1B.310.CLAD62Z)

*SCM-ESO64 or SCL-ESO64 module is needed for the EtherCAT support